

SOUTH AFRICA – JAPAN COLLABORATION

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Prepared by

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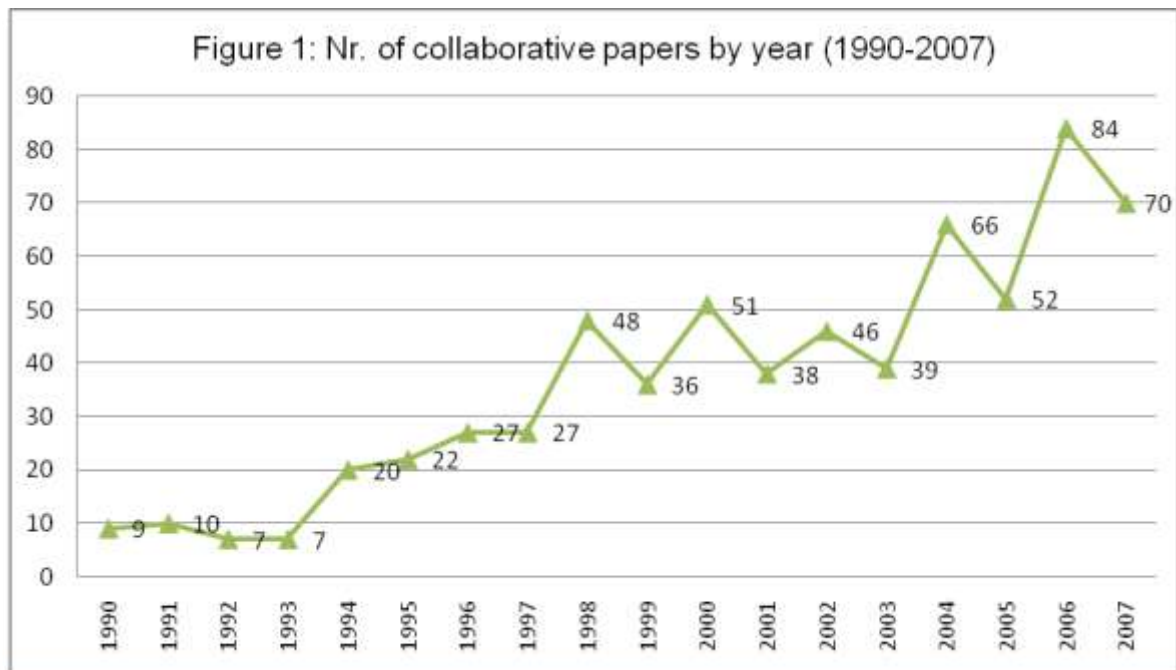
30 July 2008

1. Introduction

The data and results presented in this brief are based on SA Knowledgebase (SAK). SAK is a CREST database of South Africa's scientific output as measured in articles published in peer-reviewed journals. SAK currently covers all articles published since 1990, both in International Science Index (ISI) journals, and in South African journals accredited by the Department of Education (DoE). The results highlight the following: number of papers produced since 1990, scientific fields of collaboration, collaborating institutions, and journals in which most of the scientific articles are published.

2. Scientific output (1990-2007)

The first results show that during the period 1990 - 2007, 659 scientific papers in total were published with at least one South African and one Japanese author collaborating.



In the four years beginning 1990 and ending 1993, less than 10 co-authored papers were produced annually. Since 1994 there has been a steady overall growth although we also see rather huge fluctuations over the same period. Whilst each scientific article has at least a South African and a Japanese address, some articles, in many cases, have multiple authors from other foreign institutions. Table 1 below ranks the top 10 countries that had a collaborative role in the total output in which South Africa and Japan were

partners. It is not clear however, whether South African, Japan or any of these collaborating countries had a coordinating role for any of the scientific papers.

Table 1

Other collaborating countries (Top 10)

Country	Total articles (out of 659)
USA	231
England	143
Australia	122
Germany	101
France	99
Netherlands	73
Italy	56
N. Zealand	50
India	50
China	47

Figure 2 South Africa & Japan ISI Output (2000-2007)

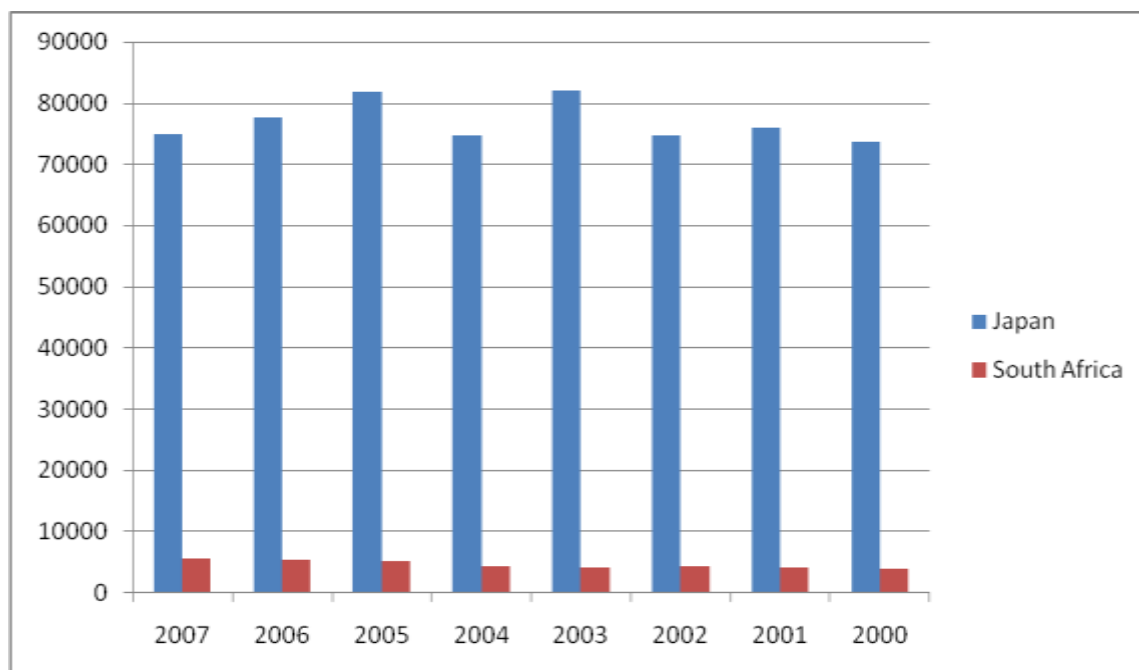


Figure 2 above shows the scientific output, according to ISI, of South Africa and of Japan between 2000 and 2007.¹ Without normalizing the outputs per year for both countries, it is noteworthy that over the last seven years Japan has produced over 13 times more ISI papers than South Africa. The following table also shows the top five scientific fields in which each country has produced consistently over the past 7 years (also according to ISI). The middle column in table 2 shows the fields of collaboration between the two countries (see figure 3 Scientific fields of collaboration)

Table 2

Top Fields of Scientific output (per country) and fields of Scientific Collaboration

Japan Top Fields of Scientific Output	Fields of Scientific collaboration	SA Top Fields of Scientific Output
1. Physics Applied	1. Astronomy & astrophysics	1. Plant sciences
2. Biochemistry & molecular biology	2. Biochemistry & molecular biology	2. Ecology
3. Materials Sciences, multidisciplinary	3. Geosciences, multidisciplinary	3. Environmental sciences
4. Physics, condensed matter	4. Microbiology	4. Medicine: general & internal
Chemistry, physical	5. Genetics & heredity	5. Infectious diseases

3. Scientific Fields of Collaboration

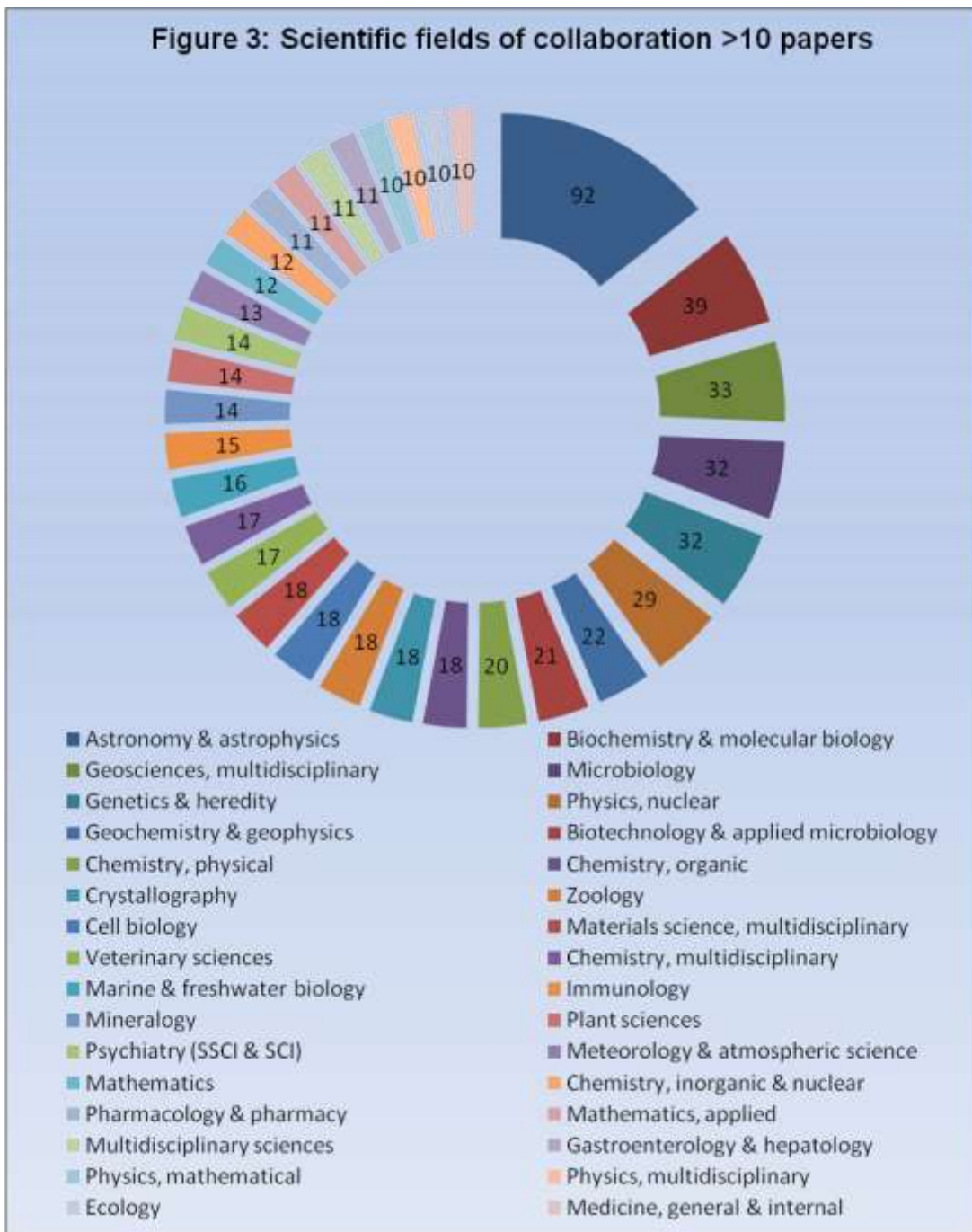
A 2005 memorandum of understanding between the *NRF* and the *Japan Society for the Promotion of Science*² (based on a general science and technology agreement between the two countries signed in 2003) served as the basis for research collaboration between South Africa and Japan, with a total of nine joint research projects receiving funding thus far. In addition, four more projects have been approved for special funding by the Department of Science and Technology in 2005, all of them proposing research in the field of materials science. http://www.nrf.ac.za/staf/binational_agreements.html

¹ Figure 2 has omitted articles from South African Journals only approved by the Department of Education (DoE)

² *The Japan Society for the Promotion of Science (JSPS)* is Japan's leading funding agency and supports so-called bottom up research activities carried out by universities and other research institutes as well as international scientific cooperation. JSPS covers all fields of science including social sciences and humanities.

http://www.jsps.org/aboutus/about_jsps/index.html

According to the agreement, the South Africa-Japan Science and Technology Priority Areas are Biotechnology, Information Technology, New and Advanced Materials, Infectious Diseases, Human Capital Development. These are broad areas of collaborative research. Results returned from SAK show over 120 ISI listed scientific fields of collaboration. Figure 3 below shows only those scientific fields with at least 10 or more co-authored papers.



The following are the five top fields of collaboration in which most co-authored articles have been published: The percentage is out of the total output of 659 scientific papers.

- Astronomy & astrophysics (14%)
- Biochemistry & molecular biology (6%)
- Geosciences, multidisciplinary (5%)
- Microbiology (5%)
- Genetics & heredity (5%)

4. Collaborating Institutions: South Africa & Japan

Figure 4 below lists the top South African institutions that collaborate mainly with Japanese institutions. The chart lists all collaborating institutions with at least 10 or more co-authored papers over the period of 17 years. At the top of the list is the University of Cape Town which represents about 23% of the total output. The departments of Chemistry, Astronomy and the School of Medicine account for most of UCT's high output of collaborative papers.

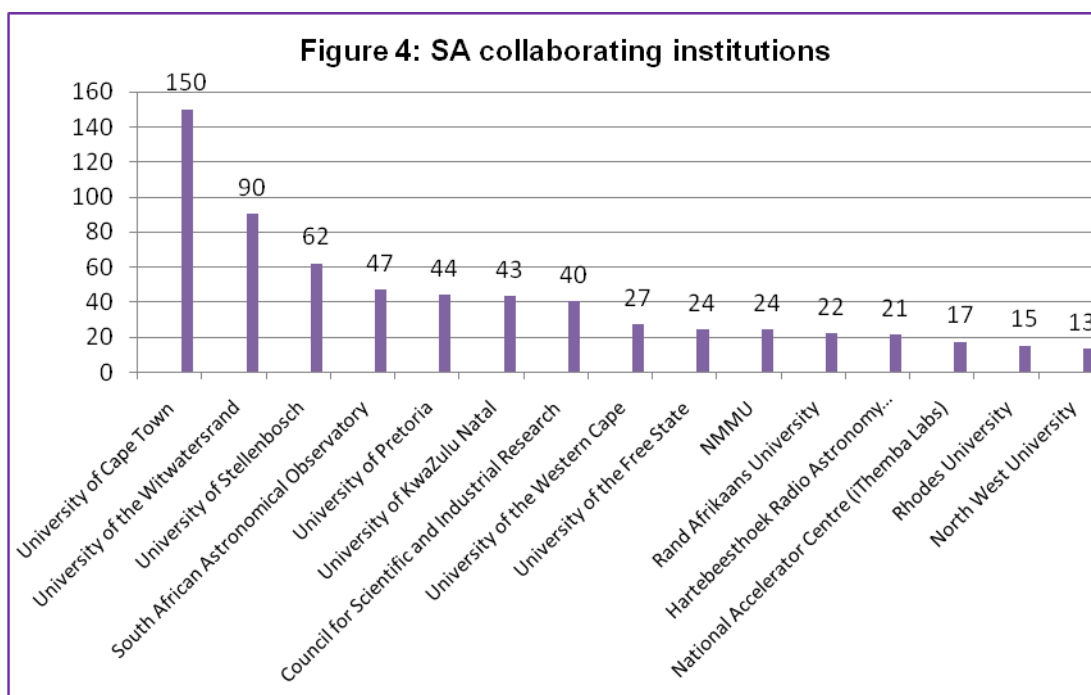
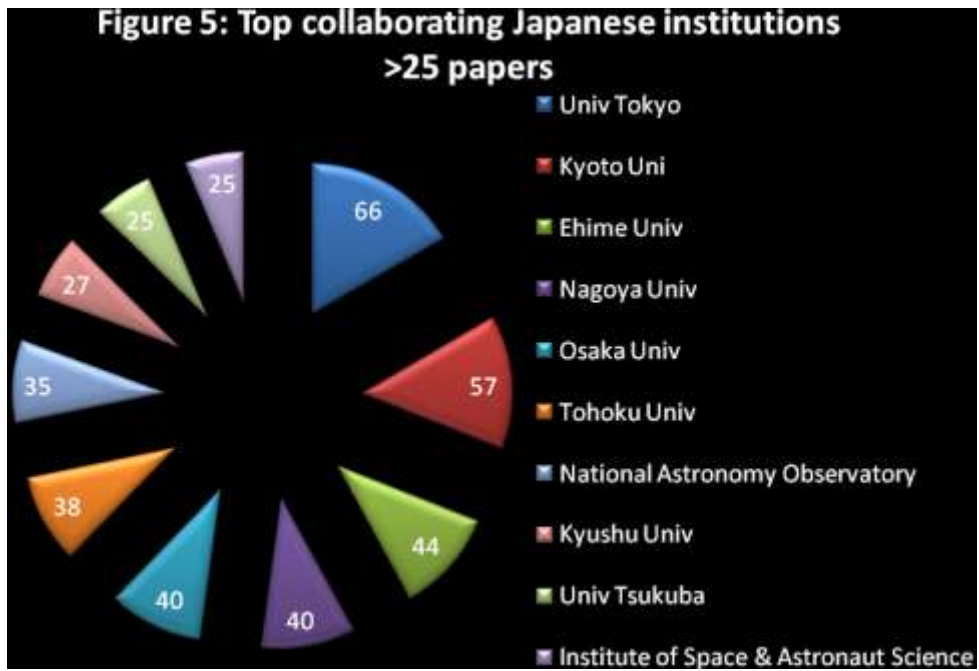


Table 3 below lists the Japanese institutions collaborating with South African ones. The table lists only those institutions that have at least 5 or more co-authored papers during the same period (i.e. 1990-2007).

Table 3*Collaborating Japanese institutions with 5 or more scientific papers*

Japanese institution	Nr. of papers
Univ Tokyo	66
Kyoto Uni	57
Ehime Univ	44
Nagoya Univ	40
Osaka Univ	40
Tohoku Univ	38
Natl Astron Observ	35
Kyushu Univ	27
Univ Tsukuba	25
Inst Space & Astronaut Sci	25
Natl Astron Observ Japan	13
Kurume Univ	8
Kochi Univ	8
Natl Inst Infect Dis	7
Obihiro Univ Agr & Vet Med	7
Keio Univ	7
SHIZUOKA UNIV	6
Univ Tokushima	6
Japan Meteorol Agcy	5

Figure 5 shows the top 10 institutions that have at least 25 or more co-authored papers. It is also evident from Figure 3 and Table 2 that most of the collaborations are between the universities of both countries and less between the research institutes and centers.



Information regarding the top collaborating Japanese institutions can be obtained from the respective websites.

5. Journals

The journals in which the co-authored papers have been published are listed in descending order. Co-authorship in these journals does not exclusively refer to South African and Japanese authors but also includes other international authors from some of the countries listed in Table 1. It is noteworthy that the only journals with at least 10 or more scientific articles (except for the International Journal of Biochemistry and Cell Biology) are in the field of astronomy and astrophysics. This partially reflects the fact that this scientific field is top of the list in the scientific fields of collaboration (Figure 2).

Table 4

Journal with 3 or more articles

Journal	Nr. of articles
MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY	26
PUBLICATIONS OF THE ASTRONOMICAL SOCIETY OF JAPAN	17

ASTROPHYSICAL JOURNAL	15
JOURNAL OF GEOPHYSICAL RESEARCH-SPACE PHYSICS	12
PHYSICAL REVIEW C	12
ASTRONOMY & ASTROPHYSICS	11
INTERNATIONAL JOURNAL OF BIOCHEMISTRY & CELL BIOLOGY	10
JOURNAL OF THE CHEMICAL SOCIETY-PERKIN TRANSACTIONS 2	9
NATURE	7
INTERNATIONAL JOURNAL OF SYSTEMATIC AND EVOLUTIONARY MICROBIOLOGY	7
GEOPHYSICAL RESEARCH LETTERS	5
PHYSICAL REVIEW C-NUCLEAR PHYSICS	5
VOX SANGUINIS	5
JOURNAL OF CHEMICAL CRYSTALLOGRAPHY	5
LANCET	5
REVUE SCIENTIFIQUE ET TECHNIQUE DE L OFFICE INTERNATIONAL DES EPIZOOTIES	5
MYCOLOGICAL RESEARCH	4
JOURNAL OF MATHEMATICAL PHYSICS	4
SUPRAMOLECULAR CHEMISTRY	4
PHYSICAL REVIEW LETTERS	4
LITHOS	4
DEEP-SEA RESEARCH PART II-TOPICAL STUDIES IN OCEANOGRAPHY	4
JOURNAL OF MINERALOGICAL AND PETROLOGICAL SCIENCES	4
PLOS GENETICS	4
JOURNAL OF GENERAL AND APPLIED MICROBIOLOGY	3

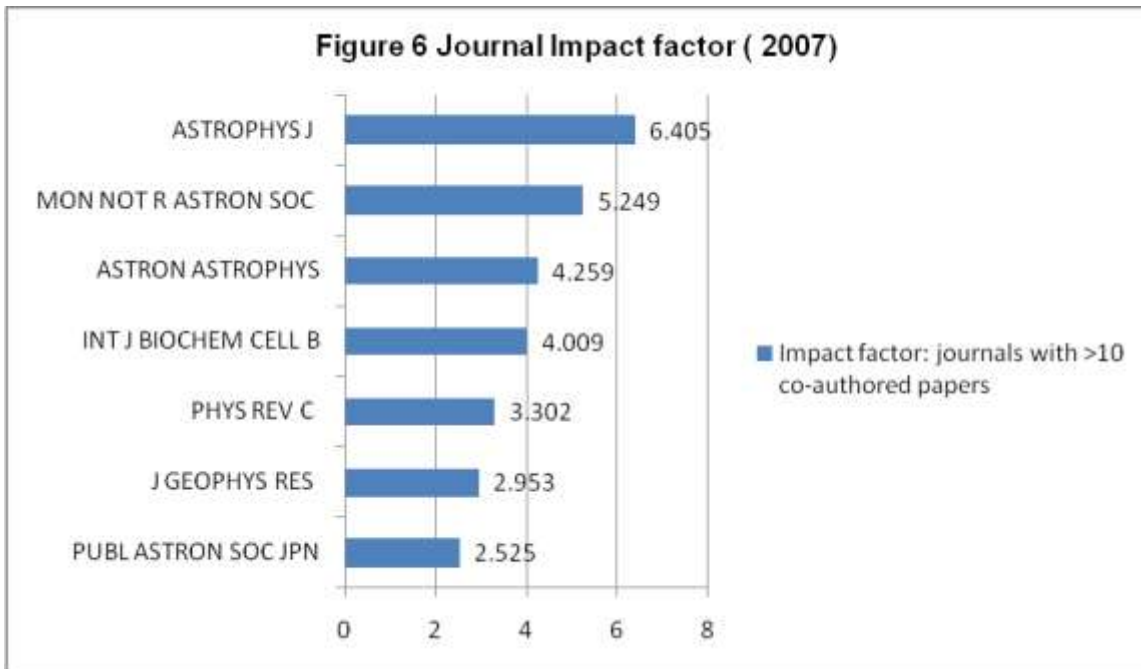
ASTRONOMICAL JOURNAL	3
JOURNAL OF CLINICAL MICROBIOLOGY	3
HUMAN GENETICS	3
ACTA CRYSTALLOGRAPHICA SECTION C-CRYSTAL STRUCTURE COMMUNICATIONS	3
INORGANICA CHIMICA ACTA	3
ANNALS OF HUMAN GENETICS	3
JOURNAL OF ANTIBIOTICS	3
THERMOCHIMICA ACTA	3
APPLIED AND ENVIRONMENTAL MICROBIOLOGY	3
NATURE GENETICS	3
ALCOHOLISM-CLINICAL AND EXPERIMENTAL RESEARCH	3
PROCEEDINGS OF THE AMERICAN MATHEMATICAL SOCIETY	3
WATER SCIENCE AND TECHNOLOGY	3

6. Journal Impact Factor

The Impact Factor measures how often articles in a specific journal have been cited.³ Figure 6 shows the Impact Factor of the top 7 journals from Table 4 that have at least 10 or more scientific papers co-authored by at least one South African and one Japanese scientist. The Impact Factors supplied below are from the *Journal Citation Reports (JCR)* available on the ISI Web of Science.⁴

³ The Impact Factor is calculated on the following basis: The total number of quotes during a year of the two immediately preceding years' issues, for example quotations in 2007 of the journals published in 2005 and 2006, are weighed against the number of articles published in 2005 and 2006 in that journal.

⁴ *Journal Citation Reports (JCR)* is a unique multidisciplinary journal evaluation tool. JCR on the Web is the only journal evaluation resource that provides statistical information based on citation data. By compiling references, JCR helps to measure research influence and impact at the journal level, and shows the relationships between citing and cited journals. It presents quantifiable statistical data that provides a systematic, objective way to determine the relative importance of journals within their subject categories.



According to Figure 6 and to the *JCR*, the ***Astrophysical Journal*** and the ***Monthly Notices of the Royal Astronomical Society*** are influential journals as indicated by the high Impact Factor (this is only within the limit of the South African-Japan brief).

1. *Astrophysical Journal*

Begun in 1895 by George E. Hale and James E. Keeler, ***The Astrophysical Journal*** is the foremost research journal in the world devoted to recent developments, discoveries, and theories in astronomy and astrophysics. Many of the classic discoveries of the twentieth century have first been reported in the *Journal*, which has also presented much of the important recent work on quasars, pulsars, neutron stars, black holes, solar and stellar magnetic fields, X-rays, and interstellar matter. In addition, videos that complement specific issues are periodically available. ***The Astrophysical Journal Supplement Series*** has been published since 1953 in conjunction with *The Astrophysical Journal*. Designed to bring substantial, extensive support to the material found in the *Journal*, the *Supplement Series* contains many of the most frequently cited papers in astronomical literature. <http://www.journals.uchicago.edu/page/api/brief.html>

Monthly Notices of the Royal Astronomical Society

The first issue of MNRAS was published on [February 9, 1827](#) as *Monthly Notices of the Astronomical Society of London* and it has been in continuous publication ever since. It took its current name from the second volume, after the *Astronomical Society of London* became the *Royal Astronomical Society (RAS)*. Until 1960 it carried the monthly notices of the RAS, at which time these were transferred to the newly-established *Quarterly Journal of the Royal Astronomical Society* (1960-1996) and then to its successor journal *Astronomy & Geophysics* (since 1997). Until 1965, MNRAS was published in-house by the RAS, since when it has been published by [Blackwell Scientific Publications](#) (later [Blackwell Publishing](#)) on behalf of the RAS. In addition to no longer carrying the notices of the RAS, the journal is now not monthly, with thirty-six issues a year divided into nine volumes.

http://en.wikipedia.org/wiki/Monthly_Notices_of_the_Royal_Astronomical_Society

7. Conclusion

It is clear that collaboration between South Africa and Japan has steadily increased since 1994 and has over the past 5 years consistently been over 50 papers. Given the relative size of both science systems and their total output, there is obviously huge opportunities for further collaboration.
